

REMARKS

Claims 8-10 are presently pending in this application.

The Examiner has required an election of species between the heating-cooling bath of Fig. 1 and the electrical heating of Fig. 2. The Examiner contends that the species are independent or distinct because they are not disclosed as being usable together and are therefore mutually exclusive. The Examiner holds that claims 1 and 4 are generic.

While not necessarily agreeing with the Examiner's requirement, Applicant elects the species of Fig. 1 (heating-cooling bath), without traverse. Applicant believes that original claims 1, 2, 5 and 7 (now claims 8-10) read on the elected species of Fig.1. Accordingly, original claims 3 and 6 have been cancelled, as directed to the non-elected species, without prejudice to the filing of a divisional application directed to the subject matter thereof.

The subject matter of original claims 1 and 2 has been rewritten as new claim 8, with the addition that the pressure vessel has a coil shape and sufficient heat conductivity for heating or cooling the liquid and the pressure vessel together. These amendments are supported, for example, in original claims 1 and 2, in the specification at page 3, lines 18-21, in the examples at page 6, and in Figs. 1-5. Original claims 5 and 7 have been rewritten as new claims 9 and 10, depending from claim 8, and claim 4 has been cancelled as redundant of new claim 9. No new matter has been added, and entry of the amendments is respectfully requested.

The Examiner has rejected original claims 1-7 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement and under 35 U.S.C. § 112, second paragraph, as being indefinite on the ground that their scope cannot be clearly ascertained based on a non-enabling disclosure. The Examiner points out, that as described in the specification, the end-openings 1a and 1b are sealed with plugs 2 and 2. The Examiner questions how fluid can flow through the end opening if they are sealed with plugs, since the plugs would appear to render the device inoperative as to pump fluid. This rejection is respectfully traversed for the reasons set forth in detail below.

It is submitted that it would be readily apparent to one of ordinary skill in the art that the plugs, 2, 2 shown in the Figs. must be removed from end-openings 1a and 1b in order to allow liquid to flow out of these openings during pumping of the liquid (see description of Figs. 1 and 2, at page 4, lines 5-22 of the specification). Accordingly, there is no contradiction in the description of the invention, and the invention is enabled and definite in accordance with 35 U.S.C. § 112, first and second paragraphs. Reconsideration and withdrawal of the rejections are respectfully requested.

The Examiner has rejected original claim 1 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 3,087,438 of Ciesielski ("Ciesielski"); has rejected claims 1 and 3 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 4,917,575 of Miller et al (Miller et al"); and has rejected claims 1, 2 and 7 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 4, 281,969 of Doub ("Doub"). In addition, the Examiner has rejected claim 4 under 35 U.S.C. 103(a) as being unpatentable over Ciesielski; has rejected claim 5 under 35 U.S.C. § 103(a) as being unpatentable over Doub; and has rejected claim 6 under 35 U.S.C. § 103(a) as being unpatentable over Miller et al.

These rejections are respectfully but strenuously traversed for the reasons set forth in detail below. However, in view of the incorporation of the subject matter of claims 1 and 2 into new claim 8 and the rewriting of claims 5 and 7 as new claims 9 and 10, the rejections based on Ciesielski and Miller et al are moot. That is, claims 1, 3, 4 and 6, which the Examiner rejected over Ciesielski and Miller et al, have been cancelled. Therefore, only the rejections over Doub are discussed below.

The Examiner contends that Doub discloses a liquid pump having a pressure vessel 112 which is immersed in a heating-cooling bath for pumping fluid by the difference in a coefficient of thermal expansion of the pressure vessel and the liquid. The Examiner further contends that the specific inner diameter and length of the tube 112 are dimensions which are deemed to be obtainable through routine optimization experimentation and are not deemed critical in view of their open-ended ranges.

The pressure vessel 112 of Doub is shown (Fig. 2) and described (top of column 5) as a cylindrical inner chamber or housing surrounded by a fluid stream of thermo medium.

Thus, the inner chamber of Doub is straight with a minimal ratio of surface area to volume, resulting in a rather inefficient vessel for fluid pumping. In contrast, the pressure vessel of the presently claimed invention has a coil shape, which allows for compact insertion in the heating-cooling bath, and in the preferred embodiment of claim 9 has a high length to diameter ratio and therefore a high surface area to volume ratio, resulting in a highly efficient utilization of the difference of the thermal expansion of the pressure vessel and the liquid caused by heating or cooling.

Such a coil shaped pressure vessel is neither taught nor suggested by Doub. Moreover, the cylindrical inner chamber of Doub could not practically be made into a coiled shape, and the dimensions are therefore not obtainable through routine optimization experimentation. Accordingly, the rejections under both 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a) are improper as applied to the present claims, and should be withdrawn.

In view of the above amendments and remarks, it is submitted that all of the claims in the application fully comply with the requirements of 35 U.S.C. § 112, as well as patentably distinguishing over the prior art of record. Reconsideration and early Notice of Allowance are respectfully solicited.

Respectfully submitted,
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(Date)

By:



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Enclosure: Petition for Extension of Time (two-months)